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臺灣大學應用力學研究所  
演 講 公 告

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講 題：輕金屬合金腐蝕及氧化行為之顯微結構觀點

主 持 人：周逸儒教授

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輕金屬合金腐蝕及氧化行為之顯微結構觀點  
**Microscopic Insights on the Corrosion and  
Oxidation Behavior of Lightweight Alloys**

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## Abstract

With the foreseeing end of fossil fuel and increasing environmental awareness, energy has become one of the critical issues for the future of human civilization. The introduction of lightweight alloys as structural materials is one of the effective ways to improve the fuel efficiency of transportation. However, due to the high reactivity of the base elements, such as Mg and Ti, susceptibility to corrosion and oxidation limits the widespread of lightweight alloys.

In this talk, the corrosion mechanism of Mg alloys and oxidation behavior of a Si coated Ti were investigated from a microscopic point of view. To be specific, localized corrosion of Mg alloys under both free immersion and anodic polarization was found to be governed by a common mechanism. While localized corrosion fronts propagate laterally a few microns underneath the surface corrosion film, rising streams of hydrogen bubbles are observed to evolve at the propagating corrosion fronts. On the other hand, reaction and competing oxidation between Si and Ti resulted in a complex layered structure on the Si coated Ti, with  $\text{TiO}_2$  and lamellar  $\text{TiO}_2/\text{SiO}_2$  as the outer oxide scales and  $\text{Ti}_5\text{Si}_3$  as the interfacial layer. These microscopic insights provide fundamental understandings about the corrosion and oxidation behavior of lightweight alloys, which could guide the design and development of next-generation lightweight alloys.